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EXAMINER

LANDAU, MATTHEW C

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 15

Application Number: 09/930,361
Filing Date: August 15, 2001
Appellant(s): ANO, KAZUAKI

Michael K. Skrehot
For Appellant

EXAMINER'S ANSWER

MAILED
JAN 08 2004
GROUP 2800

This is in response to the appeal brief filed October 8, 2003.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existence of any related appeals and interferences.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

No amendment after final has been filed.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1-6, 8-11, and 18-26 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

US Pat. 5,888,849	Johnson	3-1999
US Pat. 6,194,781	Ikegami	2-2001
US Pat. Appl. Pub. 2002/0066592	Cheng	6-2002
US Pat. 5,594,234	Carter, Jr. et al.	1-1997

(10) *Grounds of Rejection*

The following ground(s) of rejection are applicable to the appealed claims:

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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It is unclear how the encapsulant can cover the chip but not cover “said portion of said sheet metal in said opening coplanar with said second surface of said substrate”, since the chip is mounted on that portion. Figure 1 of the instant application shows an encapsulant 108 covering the portion (the top surface) of the sheet metal 105b in the opening. Therefore, it is unclear what applicant intends to claim.

Claims 1, 2, 4-6, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson.

In regards to claim 1, Figure 6 of Johnson discloses a tape 1 having first and second surfaces comprising: a plurality of contact lands and conductive routing lines integral with said first surface of said tape; and a chip mount pad 10 secured to said first surface, coplanar with said second surface.

In regards to claim 2, Figure 6 of Johnson discloses a tape 1 having first and second surfaces and first and second openings, for use in the assembly of semiconductor chips, comprising: a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, covering said first openings in said tape; and a chip mount pad 10 in each of said second openings, attached to said first surface and shaped to be coplanar with said second surface.

In regards to claim 4, the presence of the process limitation “created by a photolithographic patterning and chemical etch process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

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In regards to claim 5, the presence of the process limitation “provided by a mechanical coining process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

In regards to claim 6, the presence of the process limitation “created by a mechanical punching process” does not patentably distinguish over prior art, therefore cannot impart patentability to the product.

In regards to claim 18, Figure 6 of Johnson discloses a packaged integrated circuit comprising a substrate 1 having first and second opposing surfaces; said substrate including an opening extending through said substrate from said first surface to said second surface; a chip mount pad 10 comprising a sheet of metal (copper), a portion of said sheet of metal on said first surface of said substrate and a portion of said sheet of metal covering said opening such that said portion of said sheet of metal covering said opening is coplanar with said second surface of said substrate, said portion of said sheet of metal covering said opening having a first and second opposing surfaces, said second surface of said sheet of metal covering said opening being coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on said first surface of said sheet of metal in said opening.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Ikegami.

The difference between Johnson and the claimed invention is the routing lines and contact lands made of copper foil plated with nickel and gold. Ikegami discloses a pad electrodes formed by etching copper foil and further plated with nickel and gold (see column 1,

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lines 55-60). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by using copper foil plated with nickel and gold for the wiring pattern. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of preventing corrosion and enhancing the electrical conductivity.

Claim 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Cheng.

In regards to claim 8, Figure 6 of Johnson discloses a low-profile, high power semiconductor device including: a plastic tape 1 having first and second surfaces; a plurality of electrically conductive routing lines and a plurality of contact lands on said first surface, said lands exposed by first openings in said tape; second openings in said tape configured to accommodate the chips; a chip mount pad 10 covering each of said second openings, attached to said first surface and shaped to be coplanar with said second surface; a circuit chip 6 mounted by means of a thermally conductive material 15 on the chip mount pad; encapsulating material 16 surrounding said first tape surface; and solder balls 7 attached to each of the exposed lands. The difference between Johnson and the claimed invention bonding wires connecting said chip to said contact lands. Figure 2 of Cheng discloses a circuit chip 21 connected to on a substrate 24 by way of both bonding wires 212 and conductive leads 222. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including bonding wires to connect the chip to the contact lands. The

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ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of providing an additional means for controlling operation of the chip circuitry.

In regards to claim 9, Figure 6 of Johnson discloses chip mount pads 10 which provide a direct thermal path to the circuit chips 6.

In regards to claims 10, the presence of the intended use limitation "...chip mount pads serve as a heat convection surface..." does not structurally distinguish over the prior art, therefore cannot impart patentability to the claimed device.

In regards to claim 11, the presence of the process limitation "created by a transfer molding process" does not patentably distinguish over the prior art, therefore cannot impart patentability to the product.

Claims 19-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Carter, Jr. et al. (US Pat. 5,594,234, hereinafter Carter).

In regards to claim 19, Figure 6 of Johnson discloses an encapsulant 3 covering a portion of a first surface of the substrate but does not cover a second surface of the substrate and an encapsulant 16 covering the chip 6. As best the examiner can ascertain the claimed invention, the difference between Johnson and the claimed invention is the encapsulant does not cover the second surface of said sheet metal covering said opening. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the second surface of

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the mount pad. The ordinary artisan would have been motivated to modify Johnson for the purpose allowing direct attachment of a heatsink to the mount pad.

In regards to claim 20, the difference between Johnson and the claimed invention is a heatsink attached to said second surface of said sheet metal covering said opening. Figure 12 of Carter discloses a heatsink 86a connected to a die mount pad 82 on the surface opposite to the die 83. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including a heat sink attached to the second surface of the chip mount pad. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of dissipating heat from the semiconductor device.

In regards to claim 21, the difference between Johnson and the claimed invention is the second surface of the sheet metal attached to a printed circuit board. Figure 12 of Carter discloses a printed wiring (circuit) board 84 connected to the bottom surface of a die mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by attaching the second surface of the sheet metal to a printed circuit board. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose providing an external connection to the circuit chip.

In regards to claim 22, Figure 6 of Johnson discloses a packaged integrated circuit comprising a substrate 1 having first and second opposing surfaces; said substrate including an opening extending through said substrate from said first surface to said second surface; a chip mount pad 10 of metal foil attached to said first surface of said substrate and downset into and

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covering said opening such that a bottom surface of said chip mount pad is coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on a top surface of said chip mount pad; encapsulation (3,16) on said first surface of said substrate and not on said second surface of said substrate, such that said encapsulation covers said chip. The difference between Johnson and the claimed invention is the encapsulant does not cover said bottom surface of said chip mount pad. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the bottom surface of the mount pad. The ordinary artisan would have been motivated to modify Johnson for the purpose allowing direct attachment of a heatsink to the mount pad.

In regards to claim 23, the difference between Johnson and the claimed invention is a heatsink attached to said bottom surface of said chip mount pad. Figure 12 of Carter discloses a heatsink 86a connected to a die mount pad 82 on the surface opposite to the die 83. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including a heat sink attached to the bottom surface of the chip mount pad. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of dissipating heat from the semiconductor device.

In regards to claim 24, the difference between Johnson and the claimed invention is the bottom surface of the chip mount pad attached to a printed circuit board. Figure 12 of Carter discloses a printed wiring (circuit) board 84 connected to the bottom surface of a die mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the

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invention was made to modify the invention of Johnson by attaching the bottom surface of the chip mount pad to a printed circuit board. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose providing an external connection to the circuit chip.

Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Cheng and Carter.

In regards to claim 25, Figure 6 of Johnson discloses a substrate 1 having first and second opposing surfaces including an opening extending through said substrate from said first surface to said second surface, said opening having a first size; a plurality of contact lands on said first surface of said substrate adjacent to said opening; a chip mount pad 10 of metal foil attached to said first surface of said substrate and downset into and covering said opening such that a bottom surface of said chip mount pad is coplanar with said second surface of said substrate; an integrated circuit chip 6 mounted on a top surface of said chip mount pad, said integrated circuit chip having a second size, wherein said second size is smaller than said first size; and encapsulation (3,16) on said first surface of said substrate and not on said second surface of said substrate, such that said encapsulation covers said chip. The difference between Johnson and the claimed invention is the encapsulant does not cover said bottom surface of said chip mount pad. Figure 12 of Carter discloses an encapsulant 79 that does not cover a bottom surface of a chip mount pad 82. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by an encapsulant that does not cover the bottom surface of the mount pad for the purpose allowing direct attachment of a

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heatsink to the mount pad. A further difference between Johnson and the claimed invention is bond wires coupling said integrated circuit chip to said contact lands. Figure 2 of Cheng discloses a circuit chip 21 connected to on a substrate 24 by way of both bonding wires 212 and conductive leads 222. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Johnson by including bonding wires to connect the chip to the contact lands. The ordinary artisan would have been motivated to modify Johnson in the manner described above for the purpose of providing an additional means for controlling operation of the chip circuitry.

In regards to claim 26, Johnson discloses the substrate 1 is plastic tape (column 2, lines 32-36).

(11) Response to Argument

Examiner's response to Appellant's argument regarding the 35 U.S.C. 112, second paragraph rejection of claim 19

Appellant's argument is that the claim language is "clear and supported by the specification, including Figure 1. Appellant further states the encapsulant "clearly does not cover the bottom surface of the substrate 101 or the bottom surface of sheet metal 105b, which is coplanar with the bottom surface of substrate 101." However, the claim limitation in question reads "said encapsulant does not cover said portion of said sheet of metal covering said opening

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that is coplanar with said second surface of said substrate". This limitation does not distinguish between the top and bottom surfaces of "said portion", but merely states that the encapsulant does not cover "said portion". Claim 18 (from which claim 19 depends) states "said portion of said sheet of metal covering said opening is coplanar with said second surface of said substrate, said portion of said sheet of metal covering said opening having first and second opposing surfaces". Therefore, the limitation "said portion" includes both the first and second (top and bottom) surfaces. As stated by Appellant (and shown in Figure 1) the encapsulant covers at least part of "said portion". It is unclear how the encapsulant covers the chip but does not cover "said portion of said sheet of metal covering said opening", since it must be interpreted that "said portion" includes the top and bottom surfaces. Therefore, claim 19 is indefinite.

Examiner's response to Appellant's arguments regarding the 35 U.S.C. 102(b) rejections over Johnson

Appellant's first argument against the rejection of claim 1 under 35 U.S.C 102 is that Johnson "does not disclose a reel-to-reel tape. In response to this argument, the recitation "reel-to-reel tape" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). As indicated by Appellant, Johnson

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discloses strips of flexible film (column 3, line 5). A strip of flexible film can be considered to be a tape. A reel-to-reel tape is merely a tape that is used in reel-to-reel operations. Therefore, the limitation “reel-to-reel” is merely a recitation of intended use the tape. Also, the structural limitations in the body of the claim are able to stand-alone. For these reason’s, the limitation “reel-to-reel tape”, does not patentably distinguish the claimed invention over Johnson.

In response to Appellant’s second argument that Johnson does not disclose the claimed chip mount pad and that “element 10 in Johnson’s Figure 6 is a lead, not a mount pad”, there is no reason why the leads of Johnson cannot be considered chip mount pads. It is respectively pointed out that during patent examination, the pending claims must be give their broadest reasonable interpretation consistent with the specification. *In re Hyatt*, 211 F.3d 1367, 1272, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (see also MPEP 2111). The term “chip mount pad” was not defined in the instant application in a manner that would distinguish “chip mount pad” from the leads of Johnson. In other words, Appellant’s specification does not explicitly state any specific structural attributes that a chip mount pad must have. Figure 6 of Johnson clearly shows the chip 6 is mounted on the ends of the leads 10. Taken in a broad sense, the leads of Johnson can therefore be considered chip mount pads. As shown in Figure 6 of Johnson, the bottom surface of the chip mount pad 10 (the portion below the chip) is coplanar with the second surface of the substrate.

Appellant’s third argument that “the clear lack of physical support for chip 6 other than by leads 10 is a likely reason for Johnson’s use of encapsulant 16 around the chip and leads” is not persuasive. This statement is merely speculation and is completely unsubstantiated. At no point does the Johnson reference suggest encapsulant 16 supports the chip. Also, it appears from

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this statement that Appellant has acknowledged the leads do provide physical support for the chip.

In response to Appellant's fourth argument that "Johnson uses both the words "pad" (col. 3, line 25) and "leads" (col. 3, line 32) in his disclosure, and, in so doing, distinguishes between those terms", Johnson's use of both the words "pad" and "lead" does not mean the leads 10 cannot be considered a mount pad. At no point does Johnson disclose or suggest that the leads 10 cannot be considered a chip mount pad. Merely using both terms in his disclosure in no way prevents the Examiner from employing the broad interpretation set forth in the rejection.

Appellant's arguments against the rejection of claim 2 under 35 U.S.C 102 simply repeats the assertion that "element 10 in Johnson's Figure 6 is a lead, not a mount pad". This argument is not persuasive for the reasons set forth above. Appellant's arguments against the rejections of claims 4-6 are based on the premise that claim 2 is patentable. As indicated above, the arguments against claim 2 are not persuasive therefore these arguments are moot.

Appellant's first argument against the rejection of claim 18 under 35 U.S.C 102 is that "Johnson does not teach or suggest a chip mount pad with the claimed features covering an opening". It is first noted that the metal (copper) leads 10 of Johnson can be considered a chip mount pad for the reasons set forth above in the response to Appellant's arguments against claim 1. Appellant further argues that "leads 10 clearly do not cover the opening in substrate 1". It should be noted that the claim does not require the chip mount pad to be covering the entire opening, or completely covering the opening. Therefore, if the chip mount pad covers at least a portion of the opening, the claim limitation is anticipated. Figure 6 of Johnson clearly shows the chip mount pad 10 of Johnson covering a portion of the opening.

**Examiner's response to Appellant's argument regarding the 35 U.S.C. 103(a)
rejection over Johnson in view of Ikegami**

Appellant's argument against the rejection of claim 3 under 35 U.S.C. 103 is that "Johnson fails to disclose a chip mount pad as described in Claim 2" and that Ikegami "does not cure this deficiency of Johnson". As indicated above in the response to Appellant's arguments against claims 1 and 2, Figure 6 of Johnson anticipates all the limitations of claim 2. Therefore, the claim 3 is obvious in view of Ikegami.

**Examiner's response to Appellant's argument regarding the 35 U.S.C. 103(a)
rejections over Johnson in view of Cheng.**

Appellant's argument against the rejection of claim 8 under 35 U.S.C. 103 is that Johnson does not teach or suggest the claimed chip mount pad and that Cheng "does not cure this deficiency of Johnson." As indicated above in the response to Appellant's arguments against claims 1 and 2, Figure 6 of Johnson anticipates all the limitations of claim 2. Therefore, claims 8-11 (claims 9-11 depend from claim 8) are obvious in view of Cheng.

**Examiner's response to Appellant's arguments regarding the 35 U.S.C. 103(a)
rejections over Johnson in view of Carter.**

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Appellant's argument against the rejection of claims 19-21 under 35 U.S.C. 103 is that "Johnson does not disclose or suggest a mount pad covering an opening in a substrate" and that "Carter does not cure that deficiency of Johnson". As indicated above in the response to Appellant's arguments against claims 1 and 18, Figure 6 of Johnson anticipates all the limitations of claim 18. Appellant further argues, "Carter's package is a leadframe based package and thus does not include a substrate. A skilled artisan would therefore receive no motivation from Johnson or Carter to combine Carter's teachings with those of Johnson". This argument is not persuasive. Both Johnson and Carter are drawn to a package for a semiconductor die (chip). Therefore, the disclosures of Johnson and Carter are within the same scope of invention. In other words, the art is analogous. Carter is merely relied upon for the teaching of an encapsulant that does not cover a bottom surface of a chip mount pad. A specific motivation for combining the teachings of Carter with those of Johnson was provided in the rejection. This motivation, "for the purpose of allowing direct attachment of a heatsink to the mount pad", can be found in the abstract of Carter. Therefore claims 19-21, which depend from claim 18, are obvious in view of Carter.

Appellant's argument against the rejection of claim 22 under 35 U.S.C. 103 is that "Johnson does not disclose or suggest a chip mount pad downset into and covering an opening in substrate" and that "Carter does not cure that deficiency of Johnson". As indicated above in the response to Appellant's arguments against claims 1 and 18, Figure 6 of Johnson discloses a chip mount pad 10 that covers an opening in a substrate. Figure 6 of Johnson also shows the chip mount pad 10 is downset in the opening. Appellant further argues, "Carter's package is a leadframe based package and thus does not include a substrate. The skilled artisan would

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therefore receive no motivation from Johnson or Carter to combine Carter's teachings with those of Johnson". As above indicated in the response to Appellant's arguments regarding claims 19-21, the ordinary artisan would be motivated to combine the teachings of Carter with Johnson. Therefore, claim 22 is obvious in view of Carter.

Examiner's response to Appellant's argument regarding the 35 U.S.C. 103(a) rejections over Johnson in view of Cheng and Carter.

Appellant's argument against the rejection of claim 25 under 35 U.S.C. 103 is that "Johnson does not disclose or suggest a chip mount pad downset into and covering an opening in substrate" and that "neither Cheng nor Carter cures that deficiency of Johnson". As indicated above in the response to Appellant's arguments against claims 1 and 18, Figure 6 of Johnson discloses a chip mount pad 10 that covers an opening in a substrate. Figure 6 of Johnson also shows the chip mount pad 10 is downset in the opening. Appellant further argues, "Cheng does not disclose and opening or die mount pad as claimed. Carter's package is a leadframe based package and thus does not include a substrate. The skilled artisan would therefore receive no motivation from Johnson or Carter or Cheng to combine Carter's teachings with those of Johnson and Cheng". Johnson, Cheng, and Carter are all drawn to a package for a semiconductor die (chip). Therefore, the disclosures of Johnson, Cheng, and Carter are within the same scope of invention. Specific motivations for combining the teachings of Cheng, Carter, and Johnson were provided in the rejection. Therefore, claims 25 and 26 (claim 26 depends from claim 25) are obvious in view of Carter and Cheng.

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Conclusion

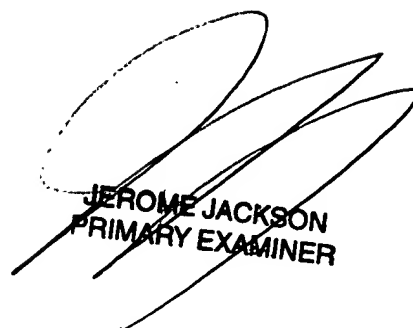
For all of the above-noted reasons, the rejections under 35 U.S.C 112, 102, and 103 should be sustained.

Respectively submitted

Matthew C. Landau

Examiner

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JEROME JACKSON
PRIMARY EXAMINER